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ABSTRACT

This study analyzed the relationship between the kinds of questions asked during a microteaching session and the achievement of students subsequently taught under classroom-like conditions. Teachers taught the same topics in microteaching; each taught a 2-week course 6 weeks later. Each question asked was classified in one of eight categories. The categories identified the question by its cognitive complexity, immediacy to the student, and source of verifiability. No single type of question was associated systematically with achievement; different types of questions predicted achievement in a topic by subject by question interaction. (Appropriate tables are included.) (Author)

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The Relation of Teacher's Questions in Microteaching and Microcourses to Student Achievement and Rating of the Teacher

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This study was designed to answer three questions: (1) what is the relation between types of teachers' questions and students' achievement; (2) what is the relation bewteen the types of questions teachers ask and students' evaluations of the teachers; (3) what is the relation between teachers' questioning behavior in microteaching sessions and their questioning behavior in microcourses?

This study is one in a series of studies on the relation of teachers' performances to students' learning. In this study, the teacher's performances which are the independent variables are types of questions asked by teachers. The dependent variable is students' learning.

The general problem to which this study addresses itself is the relation between the kinds of stimuli that the teacher provides to evoke cognitive responses in students and what students learn when such stimuli are presented to them. Teachers' questions may be thought of as eliciting stimuli; that is, as stimuli which evoke certain cognitive responses in students. These cognitive responses, which are unobservable, elicit responses which produce the responses which are the criterion behaviors to be acquired by students. In many cases, however, the teachers' questions elicit the responses which the students are to acquire. In either case the effects of the teachers' questions should be reflected in measures of students' learning.

This study also analyzed two other questions: (1) is there a relation between the kinds of questions a teacher asks in microteaching and those he or she asks in more complex teaching situations; (2) is there a relation between the kind of question a teacher asks in microteaching and the performance of his or her students in more complex teaching situations.

The first question is a question about the reliability of the teacher's behavior. It is a question that asks, how consistent is the teacher's behavior? Does the teacher ask the same kind of questions even though the teaching situations in which the questions are asked vary in the numbers of students taught, the length of time for which they are taught, and the complexity of the objectives of the teaching.

The second question--what is the relation of the teacher's questions in microteaching to those he or she asks in more complex teaching situations--is an important question to ask because its answer is relevant to establishing the validity of microteaching as a training procedure. Some, perhaps many individuals, interested in using microteaching for training are concerned about the relation between a teacher's performance in microteaching and subsequent teaching performance. This study provides information on this relation; but it also asks a more rigorous question, "Can you predict what a teacher's students will learn in more complex teaching situations if you know what a teacher's performance is in microteaching?" It is important to answer this question if we wish to assess teachers' performances during training with a view to certifying them for teaching.

Methodology

A number of variables must be controlled if these questions are to have meaningful answers. The methodology used in this study controlled the assignment of students to classes, the objectives to which the teachers taught, the content taught, the preparation of the students on the content taught, the length of the teaching sessions, and the directions given to teachers about the type of teaching to be enacted.

The Independent Variable

The independent variable in this study is the type of question asked by the teacher. A system for classifying questions has been developed which classifies questions along three dimensions: (1) the concreteness or abstractness of the question; (2) the referent of the question, either an observable or the perceptions, feelings, or opinions of the respondent to the question; and (3) the processes in which the respondent is to engage, either to provide information relevant to or to reason about the question. Each question asked by the teacher is classified along each of these dimensions. Since there are three dimensions, and two classifications on each dimension, a question is coded in one of eight categories. See Table 1 for a description of the types of questions coded.

Both audiotapes and videotapes were made of each teaching session. Trained coders classified each question asked by a teacher into one of these eight categories. Interreliability for this coding is .90 and above. Coder agreement drop to .70 for categories of questions which occur infrequently.

The frequencies of each teacher's questions in each category was counted.

The Dependent Variable

There are three dependent variables in this study. One of these is students' scores on an achievement test; the other is the frequency of teachers' questions in each category when the teachers' behavior is observed in a more complex teaching situation; and the third is the students' evaluation of the teacher.

Achievement tests were constructed by experienced teachers who had developed the content and objectives of short courses which were approximations of regular classroom teaching. The alpha coefficients for these tests were .90.

The student rating scale is a thirty-three item scale asking students to state whether or not a teacher did certain things, such as, "ask questions that made you think," and also asked them to state how they liked the teacher by responding to such statements as, "I would like to have this teacher as my teacher during the year." The scale measures, under the conditions in which it has been used, a single factor, a "favorability to the teacher" factor.

The third dependent variable is the type of question asked by the teacher. The coding of these questions has been described. (See Table 1) The type of question asked in the microcourses is the dependent variable in one analysis in which the type of question asked in microteaching is the independent variable.

All of the microteaching sessions were coded. Only the second and fourth day of the first and second weeks of the microcourses were coded, and within each teaching hour only one-half hour of teaching was coded. These limitations do not distort the data. After listening to the tapes, it was obvious that the teachers were more organized on days further into the week; the last day of the first week was used to obtain ratings of the teachers, and the last day of the second week to administer an achievement test and the rating scale. Also within each period the first ten minutes was used in silent reading of handouts, and the last ten for

reviewing and summarizing. The half-hour of each lesson coded was divided into two fifteen minute segments and the correlations between the codes for these segments were computed. These correlations ranged by type of question from .64 to .90 and by combinations of related types of questions from .75 to .92.

The Teaching Sessions

The microteaching sessions were twenty minutes in length. The teachers were given three pages of information on the topic to be taught. Four topics on censorship were used, one on the censorshop of books, and the others on the censorshop of news, movies, and songs. The topics were taught successively.

The microcourses were two weeks in length. They covered a single topic; in English, semantics and language analysis, and in Social Studies, the history of the 1920's. The content, objectives, and achievement tests were developed by experienced high school teachers. Each topic was divided into lessons, each with its own specific objectives.

The English teachers received training on the content. Both the English and Social Studies teachers were given the material several days before the first lesson.

For microteaching the teachers were given twenty minutes to prepare each topic. The directions indicated they should conduct a discussion. Similar directions were given for the microcourses.

Students Taught

High school students were randomly assigned to all classes for both types of teaching sessions. There were three boys and three girls in each microteaching session. There were twenty to tyenty-five students in each microcourse with equal numbers of boys and girls.

For the microteaching sessions the students were given a three-page description of what was to be taught and a set and sufficient period of time in which to read it. They were also shown a videotape of students participating in a discussion to illustrate the behavior expected of them. In the microcourses the teachers distributed handouts at the beginning of each lesson and allowed ten to fifteen minutes of class time for reading this material.

Teachers

The teachers were preservice teachers in the first months of professional training. This study used ten English teachers and ten Social Studies teachers.

The microteaching sessions were held in the first week of an eight week summer session and the microcourses in the sixth and seventh weeks. Some professional training intervened but none specifically related to the behaviors on which the teachers were observed. These teachers did not receive feedback on their teaching until the end of the summer session.

Results

The first question to be answered is how stable or consistent the teacher's questioning is from microteaching sessions to microcourses. The percentage frequency of each type of question was correlated with each other type, and similarly for combinations of related questions between those asked in microteaching and those asked in microcourses. Significant correlations are reported in Tables 2 and 3.

Considering the number of intercorrelations, there are very few significant ones, though it should be remenbered that the small N increases the probability of a Type II error. Performance on some topics in microteaching

is obviously related to performance in the microcourses. This result suggests a type of question by topic interaction.

There also seems to be differences in relationships for the two kinds of teachers. Inspection of the tapes did not show that the two types were treating the topics differently. This seeming difference is puzzling.

There is no pattern in the type of question consistently asked, even though these teachers asked large numbers of concrete objective information and concrete subjective information questions. Only two topics produced a significant correlation between the number of questions asked in the two types of teaching sessions. (see Table 4).

There seems to be little reason to believe that we predict performance in more complex teaching situations from those in microteaching. This conclusion must be evaluated, however, in the light of the risk of committing a Type II error because of the small N. We should also recall that the teachers were untrained for all practical purposes.

The second question to be answered is, can you predict students' learning in more complex teaching situations from the questioning behavior of the teacher. For this analysis the percentage frequency of the teachers' questions in all categories for all days of the microcourses were correlated with student achievement scores. No significant correlations were found for Social Studies Teachers. The significant correlations for English teachers are reported in Table 5. Since the final examination asked many questions calling for information, the correlation between questions calling for information and student achievement is not surprising. The negative correlations between abstract questions and student achievement is surprising. Apparently asking abstract questions did help better.

Why the correlation should be negative, for some question-types is not clear. Since relatively few such questions were asked, these correlations may be spuriously low.

The third question is, what is the relation between the type of question asked and students' ratings of teachers? No significant correlations were found.

Since in microcourses there are so few relations between the teacher's questioning behavior and students' achievement and ratings of the teacher, it does not seem sensible to report the relation between the types of the teacher's question in microteaching and these variables. However, we report these relations in Tables 6,7, 8 and 9, because they are curious, hoping that the data there will not be used to make extravagent claims for microteaching, particularly since our methodology did not use microteaching for training. Our opinion is that these correlations are statistical artifacts.

Discussion

Recall all the controls imposed in the methodology used in this study. They lend weight to the inferences made from the data. In general, we find few relationships of significance.

Two caveats are important to keep in mind. The number of teachers is small and the risk of inappropriately accepting the null hypothesis is high. The results may be different with trained teachers.

But this study lends no support to such hypotheses that the number of questions asked or that the type of question asked directly affect what students learn or how they feel about the teacher. It seems more likely that

the relation of questions to other teaching procedures is important. A detailed study of individual teachers in this sample showed, for example, that the teacher whose students had the highest mean achievement organized information and ideas systematically before asking questions and asked relatively few questions. The students of teachers who did no organizing of information scored the lowest of all classes.

Another possibility that makes sense is that the pattern, that is the interrelations among the questions, may be their most significant characteristic.

This study is but one of many that should be done. It suggests that the number and type of questions may not be a promising place to look for the effects of questioning behavior on students.

Table 1

Types of Questions Coded

No.	Name	Form
1	Concrete objective information	"Who, or what, or where, or when is or did...?"
2	Concrete objective reasoning	"Why is or did...?"
3	Concrete subjective information	"What do you think or feel about...?"
4	Concrete subjective reasoning	"Why do you think or feel that...?"
5	Abstract objective information	"What will happen if...?"
6	Abstract objective reasoning	"Why will...if...?"
7	Abstract subjective information	"What do you think you would think or feel if...?"
8	Abstract subjective reasoning	"Why do you think you would think or feel... if...?"

Table 2

The Relation of Questioning Behavior in Microteaching to Questioning Behavior in Microcourses: Social Studies Teachers (N=10)*

MICROTEACHING TOPIC	r	Type of Question
Songs	.65	Con. subj. inf.
		Combination:
	.70	Con. obj. inf. Abst. obj. inf.
Books	.76	Con. obj. inf.
	.76	Abst. subj. inf.
		Combination:
	.92	Conc. obj. inf. Abst. obj. inf.
	.85	Comb.: con. subj. inf. Abst. subj. inf.
Movies	_____	_____
News Media	_____	_____

* r must reach .63 for N=10 to be significant at the .05 level

Table 4

The Significant Correlations between the Number of Questions Asked in Microteaching and the Number Asked in Microcourses.

Social Studies Teachers

Microteaching Topic	r
Songs	.70
Books	—
Movies	.66
News Media	—

English Teachers

Microteaching Topic	r
none	

Table 5

Significant Correlations Between Teacher's Type of Question and Student Achievement in Microcourses for English Teachers (N=10).

r	Type of Question
.68	Combination: conc. obj. inf. and conc. subj. inf.
-.80	Combination: Abs. obj. inf. and Abs. obj. reas.
-.80	Combination: Abs. obj. inf. and abs. subj. inf.
-.78	Combination: All abstract questions

Table 6

Significant Correlations (p -.10) between Percentage Frequencies in ISR Categories of Teachers' Questions in Microteaching and Mean Final Achievement in Minicourses

SOCIAL STUDIES TEACHERS

	News Media	Movies	Literary	Songs
Categories				
	.66 (5)*	-.55 (1)		-.64 (7)*
		.57 (3)		
		.70 (8)*		
Combinations				
	.66 (5,6)*			
		.60 (3,4)		
		.63 (4,8)*		-.61 (7,8)
		.68 (6,8)*		
Indexes				
		EXP .76 (2,4,6,8)**		
		INF -.76 (1,3,5,7)**		
Factor Scores				
				F1 .55

* p - .05
** p - .02
*** p - .01
(two-tailed test)

Table 7

Significant Correlations (p - .10) between Percentage Frequencies in ISR Categories of Teachers' Questions in Microteaching and Mean Final Achievement in Minicourses

ENGLISH TEACHERS

	News Media	Movies	Literary	Songs
Categories				
	.73 (5)*		-.62 (6)	-.55 (2) -.62 (5)
Combinations				
	.60 (5,6) .70 (5,7)*		-.59 (5,6)	-.62 (5,6)
Indexes				
ABS	.71 (5,6,7,8)*			
CON	-.71 (1,2,3,4)*			
Factor Scores				

* p - .05
** p - .02
*** p - .01
(two-tailed test)

Table 8

Significant Correlations (p - .10) between Percentage Frequencies in ISR Categories of Teachers' Questions in Microteaching and Mean Student Ratings in Minicourses

SOCIAL STUDIES TEACHERS

	News Media	Movies	Literary	Songs
Categories				
	.55 (2)	.73 (4)**	-.56 (2) -.57 (4)	.58 (3)
Combinations				
	.60 (2,6)	.58 (2,4) .60 (3,4) .69 (4,8)* .79 (6,8)***	-.58 (2,4) -.57 (2,6)	
Indexes		EXP .85 (2,4,6,8)*** INF -.85 (1,3,5,7)***		
Factor Scores				

* p - .05
** p - .02
*** p - .01
(two-tailed test)

Table 9

Significant Correlations (p = .10) between Percentage Frequencies in ISR Categories of Teachers' Questions in Microteaching and Mean Student Ratings in Microcourses

ENGLISH TEACHERS

	News Media	Movies	Literary	Songs
Categories				
		.63 (1)*	-.77 (3)***	.71 (1)*
		-.67 (7)*		-.56 (7)
Combinations				
		.61 (1,2)		.71 (1,2)*
		.76 (1,3)**		.56 (1,3)
		.59 (1,5)	-.74 (3,4)**	.67 (1,5)*
		-.61 (3,7)	-.62 (3,7)	
		-.75 (5,7)**		-.65 (3,7)*
		-.64 (7,8)*		-.55 (5,7)
				-.56 (7,8)
Indexes				
		SUB -.61 (3,4,7,8)	SUB -.59 (3,4,7,8)	SUB -.67 (3,4,7,8)*
		OBJ .61 (1,2,5,6)	OBJ .59 (1,2,5,6)	OBJ .67 (1,2,5,6)*
		ABS -.71 (5,6,7,8)*		ABS -.57 (5,6,7,8)
		CON .71 (1,2,3,4)*		CON .57 (1,2,3,4)
Factor Scores				
		F2 -.65*		F2 -.72**
			F3 .71*	F3 -.59

* p - .05
** p - .02
*** p - .01
(two-tailed test)